

H. Merope, has a very distinct structure, and, I think, may be more nearly allied to the genus *Melanagria* (Arge).

4. *Hipparchioides mirifica*. Pl. III. fig. 1.

♀, *Lasiommata mirifica*, Butler, Ann. & Mag. Nat. Hist. vol. xvii. p. 286 (1866).

Hab. —? B.M.

Two wings and part of the body of this insect are in the National Collection. It is evidently a beautiful insect when perfect.

XXIII.—*On some points in the Muscular Anatomy of the Marsupials*. By the Rev. SAMUEL HAUGHTON, M.D., F.R.S., Fellow of Trinity College, Dublin.

THE following observations were suggested to me by the dissection of several Kangaroos, Phalangers, and Opossums, which were placed at my disposal by the Council of the Royal Zoological Society of Ireland. Several points of much interest turned up in the course of my dissections; but I shall confine myself at present to a few observations on the cremaster and quadratus femoris muscles, which seem to have escaped the notice of other observers:—

I. *The Cremaster Muscle in the Marsupials*.

Professor Owen thus describes the cremaster muscle:—

“The cremaster in the Phalanger and Opossum is not a fasciculus of fibres simply detached from the lower margin of the internal oblique or transversalis, but arises by a narrow though strong aponeurosis from the ilium, within and a little above the lower boundary of the internal oblique, with the fibres of which the course of the cremaster is not parallel; it might be considered as a part of the transversalis, but is separated by the fascia above mentioned from the carneous part of that muscle. Having emerged from beneath the margin of the internal oblique, the cremaster escapes by the large elliptic abdominal ring, bends round the marsupial bone near its free extremity, and expands upon the tunica vaginalis testis. In the female it has the same origin, course, and size, but spreads over the mammary glands at the back of the pouch. If the anterior fascicles of the diverging and embracing fibres be dissected from the posterior ones, the appearance of the cremaster dividing into two layers is produced”*.

* Cyclopædia of Anatomy and Physiology, vol. iii. p. 288.

The cremaster muscle was found by me to have the following weights:—

Giant Kangaroo (female)	0·38 oz. av.
Wallaby (male)	0·09 „
Opossum (female)	0·01 „
„ (male)	0·02 „

In the male Wallaby the muscle was 6 inches in length, and must be shortened to 2 inches during coition, which is, I believe, a greater amount of contraction than is recorded of any other muscle in the animal kingdom. The cremaster muscle, in all the Marsupials I have examined, forms the lower border of the transversalis muscle, taking its origin from the edge of the ilium directly. The transversalis itself is only four and a half times the mass of the cremaster, and takes its origin from the superior anterior edge of the ilium, from the lumbar fascia, and from the last two ribs, and is inserted into the fascia of the internal oblique.

It seems very strange that a muscle having so definite an object as the cremaster should in the female Marsupials be diverted to fulfil a purpose essentially distinct from its function in the male. I think, however, that a little reflection and an application of the doctrine of final causes will enable us to explain with ease this apparent anomaly.

The placental Mammals, which are higher in organization and intelligence than the Marsupials, are not entrusted with the responsibility of feeding their young, by voluntary efforts, during foetal life; and yet we find the young of the non-placental Marsupials transferred from the uterus to the marsupium long before they can exert the power of suction, and apparently abandoned to the voluntary efforts of the mother, who supplies them with milk by compressing the mammary gland from time to time by means of the contraction of the cremaster muscle, which spreads itself out over the back of the gland in a fan-shaped form.

As it was not possible for me to believe that so stupid a mother as a kangaroo or opossum should be entrusted with a duty withheld from a tigress, or even a woman, I examined carefully the mechanism of suckling a young kangaroo, with the view of discovering some self-acting cause of irritation to provoke the cremaster muscle to contract, without the necessity of supposing the volition of the mother to intervene; and I believe that I have discovered such a cause, quite adequate to produce the effect required.

The cremaster muscle, in the female Marsupials, winds round the marsupial bone to the back of the mammary gland placed

above it, so as to form an acute angle, and is liable to be stretched by every *depression* of that bone.

The marsupial bone, as is well known, turns upon a long hinge coinciding nearly with the pectineal line of the ilium, and is raised and depressed by the following muscles, which tend to turn it round that hinge:—

1. *Levators of the Marsupial Bones.*

1. The external oblique takes its origin from the lumbar fascia and from all the ribs except the first, and is inserted into the whole length of the marsupial bone, as well as into the inner edge of the pubes and edge of the ilium. This muscle is continuous with the pectoral at the extremity of the sternum, and weighs in the Giant Kangaroo 5·35 oz. It exerts little, if any, action on the marsupial bone in its usual position in the wall of the abdomen; but when this bone is depressed by the weight of the young in the marsupium, the external oblique is capable of acting as a powerful levator ossis marsupii.

2. The rectus abdominis takes its origin from the first rib and middle line of the sternum and abdomen, and is inserted into the anterior surface and inner edge of the marsupial bone only, of which it is the proper levator. In the Giant Kangaroo it measures 27 inches in length, and weighs 3·43 oz.

2. *Depressors of the Marsupial Bones.*

1. The pectineus takes its origin from the pectineal line and base of the marsupial bone behind the spine of the pubes, and acts as one of the depressors. It is inserted into the second fourth of the linea aspera. It weighs in

The Giant Kangaroo	0·36 oz.
The Wallaby	0·25 „

2. The adductor brevis takes its origin from the anterior line of the pubes, inside the adductor magnus, and is inserted into the upper fourth of the linea aspera. It acts as a depressor of the marsupial bone, and weighs in

The Giant Kangaroo	0·25 oz.
The Wallaby	0·21 „

3. The adductor magnus takes origin from the anterior edge of the pubes, from the base of the marsupial bone, from the symphysis pubis, and from the top of the pubic arch, and is inserted into the whole length of the linea aspera. It is a depressor ossis marsupii, and weighs in

The Giant Kangaroo	5·22 oz.
The Wallaby	2·96 „

It is evident from the foregoing that the marsupial bones, supporting as they do occasionally a considerable weight, are held in equilibrium by the opposing action of two levators and three depressors; so that, in active motions of the mother, the bone vibrates, balancing itself backwards and forwards as it is impelled by the inertia of the guts and of the young in the pouch, and by the opposing actions of the muscles, and thus perpetually "tips" the cremaster muscle that winds round it, exciting it to contract upon the mammary gland, and so feed the helpless young one suspended, by an almost organic union, from the nippel of the gland inside the pouch.

By means of this self-acting mechanism the young is perpetually fed, and the mother marsupial relieved from a care that would infallibly prove too great for her little modicum of brains.

I may mention that I have confirmed the foregoing explanation by the careful dissection of the male Marsupials, in which I find that the cremaster muscle passes from the abdominal ring to the testis in such a manner as to clear the marsupial bone; so that the cremaster in the male is not *tipped* by the marsupial bone at every motion of the body, as it must be in the case of the female marsupial, carrying her young permanently in her pouch.

II. *The Quadratus femoris Muscle in the Marsupials.*

This seems to me to be one of the most remarkable muscles found in the Kangaroos, and is intended to assist in the support of these animals while resting in their favourite attitude, sitting on the tail and hind legs. It takes its origin from a large triangular surface on the ischium, and thence converging in a pyramidal mass to a point, is inserted into a special trochanter or tubercle developed for its reception in the middle of the posterior surface of the shaft of the femur. Fully two-thirds of this pyramidal mass are composed of tendinous fibres, the remaining third being muscular; so that the whole may be regarded as forming an elastic tendon. When the animal sits upon its tail and legs in the manner above described, it sometimes places its feet so far forward, and its tail so far back, that a mechanical observer is at once struck by the apparent want of strength in the arch on which the weight of the body is supported, and feels disposed to come to the conclusion that the act of sitting on its tail must be a fatiguing one to the kangaroo. Observation of their habits, however, abundantly proves the contrary, and shows that the animal prefers this attitude to any other.

The explanation of this difficulty is to be found in the semi-tendinous condition as well as great size of the quadratus femoris,

which acts as a “*tie-beam*” to a portion of the arch, and without much expenditure of force supports the weight of the body placed on the vertex of the straddling arch formed by the tail and hind feet.

I do not know of any other animal in which the quadratus femoris is inserted so low down on the femur, nor of any in which, as in the kangaroo, a special trochanter is provided for the insertion of this muscle. Its weight is

In the Giant Kangaroo	1.47 oz.
In the Wallaby	0.91 ,,

The relative *moment* of the quadratus femoris in man, the *Quadrumana*, and the kangaroos may be seen from the following comparison: in all cases the total weights of the hip-joint muscles being called 100, the quadratus femoris forms of the hip-joint muscles

In Man	1.25 per cent.
In the Chacma	3.01 ,,
,, Green Monkey	3.00 ,,
,, Macaque	4.01 ,,
,, Wallaby Kangaroo	5.06 ,,
,, Giant Kangaroo	3.77 ,,

XXIV.—On the *Freshwater Fishes of Algeria*.

By PAUL GERVAIS*.

IN a memoir published as long ago as the year 1853†, I gave some descriptive details of the fishes which had then been collected in Algeria in the different streams and in some lakes of that country, and showed how little they varied specifically. Including *Coptodus* and *Tellia*, both differing generically from European fishes, the number amounted only to seven, namely, *Coptodus Zillii*, a species of *Tilapia*; *Zillia apoda*, of the family of *Cyprinodontes*; a Bleak (*Leuciscus callensis*, Guichenot); three Barbels, one of which even is contestable (*Barbus callensis*, Val., *B. setivimensis*, Val., and *B. longiceps*?, Val.); lastly, an Eel, to which M. Guichenot also thought it necessary to give a specific name (*Anguilla callensis*). This list has since been increased only by two interesting species, a Trout (*Salar macrostigma*, A. Duméril ‡) and a *Cyprinodon* (*C. doliatus* and *cyanogaster*,

* Translated by W. S. Dallas, F.L.S., &c., from the ‘Comptes Rendus,’ 17th December 1866, pp. 1051–1058.

† Bull. Soc. d’Agric. de l’Hérault, xl. p. 76; Ann. des Sci. Nat. 3^e série, xix.

‡ Revue et Magasin de Zoologie, 1858, p. 396, pl. 10.